

REMARKS/ARGUMENTS

A. Status of the Claims

Claims 22-24, 28-40, 42, 43 and 47-49 were pending at the time the Action was mailed. Claims 28, 36, 37, 39 and 48 are objected to but otherwise allowable. Thus, claims 22-24, 29-35, 38, 40, 42, 43, 47 and 49 stand rejected, variously, under 35 U.S.C. §112, first paragraph and 35 U.S.C. §103. The specific grounds for rejection, and applicants' response thereto, are set out in detail below.

Claims 22, 23, 32, and 48 are amended herein. No new matter is introduced by these amendments.

B. The Indefiniteness Rejection is Overcome

Claim 32 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite regarding a grammatical error. An amendment is provided correcting the error.

Claims utilizing the term "polythiourethane" are rejected. The claims have been amended to recite "poly(thio)urethane" instead.

Withdrawal of both rejections is respectfully requested.

C. The Rejections Under 35 U.S.C. §103 are Overcome

a. WO 01/36507 in view of Saegebarth

Claims 22-24, 29, 30, 33-35, 38, 40, 42, 43 and 49 stand rejected under §103 as obvious over the '507 application in view of Saegebarth or Bertozzi. The '507 application describes a polythiourethane obtained through polymerization of a polyamine and a polyisothiocyanate, which is itself obtained by reaction of a polythiol monomer and a polyiso(thio)cyanate monomer. Further, the '507 application aims at preparing a material for lenses having a high refractive

index and a good impact resistance (page 3, L. 11-21). Thus, the '507 application is directed at solving the same problem as the present invention, albeit with another material.

A significant difference between the present invention and the '507 application is that a polythiol monomer is used instead of a polysulfide polythiol pre-polymer. Saegebarth is cited as disclosing the preparation of -SH terminated poly(methylene sulfide) pre-polymers having the formula:



wherein n = 1-160. These compounds are (α, ω)-dithiolpolysulfide pre-polymers free of disulfide group. They may be reacted with -NCO terminated polymers or organic polyisocyanates so as to form plastic or elastomeric polythiourethanes having excellent thermal stability (col. 1, l. 23-25).

The rationale of the examiner for demonstrating the obviousness of the claims relies upon two presumptions:

- (a) he considers that the '507 application discloses that thiol reactants used for producing the pre-polymer comprise oligomers or monomers having repeating units; and
- (b) he advances Saegebarth as describing polysulfide dithiol pre-polymers lacking from the '507 application.

From these two observations, it is concluded that the rejected claims are obvious. Applicants traverse.

Addressing (a), applicants submit that the examiner's supposition is incorrect. Indeed, the counter argument previously has been made of record (see response dated August 9, 2007), and was found at the time to be persuasive at the time. In the interim, the examiner seems to

have forgotten that the term “oligomer,” as set forth in claim 7 of the ‘507 application, does not have the same meaning as in applicants’ claimed invention. In the ‘507 application, an oligomer **necessarily** has at least one disulfide linkage, as a result of the definition of polythiol oligomers in this reference (see p. 7, l. 23-37). Actually, these oligomers are formed by oxidative coupling of thiols, which creates a -S-S- group. In contrast, in applicant’s claimed invention, polythiol oligomers must be *free of disulfide linkage*.

All oligomers described in the ‘507 application from page 7, line 23, to page 9, line 30, are compounds bearing at least one disulfide linkage (-S-S-). They thus give rise to iso(thio)cyanate prepolymers bearing at least one disulfide linkage (-S-S-), which fall outside the scope of claim 22. Moreover, the ‘507 application does not contemplate the use of dithiol prepolymers within the meaning of applicant’s claimed invention (without disulfide linkage), much less **polysulfide** dithiol pre-polymers. Further, the choice of pre-polymers rather than monomers is a conscious one, and allows limiting the rigidity, and thus improvement of impact resistance. Therefore, the reference is deficient in an aspect necessary for the examiner’s position to be maintained. As such, this point alone merits withdrawal of the rejection.

Turning to (b), since the ‘507 application does not teach or suggest each of the present claim limitations, the examiner has attempted to combine it with Saegebarth, which is said to describe polysulfide dithiol pre-polymers. Accordingly, the examiner argues that the use of such compounds for producing polythiourethanes was known. This much is correct: Saegebarth does disclose/suggest the preparation of polythiourethanes from the compounds described therein. However, the examiner errs in concluding further that it would have been obvious to replace the polythiol monomer of the ‘507 application with the polysulfide dithiol pre-polymers of

Saegebarth **without** modifying the effects obtained in the ‘507 application, so as to arrive at the instant invention.

This motivation to combine the ‘507 application with Saegebarth clearly is insufficient and stems from an *ex post facto* analysis, which is improper for the following reasons. First, there is no suggestion or motivation to combine the ‘507 application with Saegebarth. Second, the examiner is improperly using hindsight reconstruction to support the obviousness rejection. Third, Saegebarth teaches away from the claimed invention. And fourth, there is no reasonable expectation of success. Each of these points is discussed further, below.

Motivation to Combine. In order to support this rejection, there must be a suggestion or motivation to combine the ‘507 application with Saegebarth. Here, however, those of skill in the art had no reason or motivation to substitute the elements of the primary reference with the secondary reference. Saegebarth is not concerned with optical applications (col. 1, l. 30: crash pads, topper pads, resilient cushions...), and does not aim at improving impact resistance of such materials. In contrast, the ‘507 application addresses optical polymers and uses thereof. There is no evidence presented, nor argument provided, as to why these two disparate references should be combined. The law requires more to establish *prima facie* obviousness.

Hindsight. It is clear that the examiner has built this rejection by relying on knowledge of the invention secured only from the instant specification. While proper when searching the art, such a hindsight analysis is quite *improper* when advancing or maintaining a rejection. *See KSR v. Teleflex*, 550 U.S. 398, 82 USPQ 2d 1385, 1397 (“[a] factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of argument reliant upon *ex post* reasoning.”). The mere fact that references *can* be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the

combination or unless the results would have been predictable to one of ordinary skill in the art. MPEP § 2143.01. *KSR* (82 USPQ.2d at 1396) highlights the importance of determining “whether there was an apparent reason to combine the known elements in the fashion claimed by [Applicant].”

So, the point is not whether the skilled person *could* have arrived at the invention by modifying the prior art, but instead whether, in expectation of the advantages actually achieved, he or she would have done so because of promptings *in the prior art*. In the present case, one of ordinary skill in the art would *not* have recognized that the results of the combination were predictable, *i.e.*, that the polythiols described in Saegebarth would yield materials having satisfactory impact resistance, transparency and non-elastomeric properties. Choosing the claimed polysulfide dithiols prepolymers was not a predictable endeavor that could have been implemented by a person of ordinary skill to solve the recognized problem of improving the impact resistance of a polythiourethane material, while remaining transparent and non-elastomeric. This outcome was merely an intellectual possibility, but was not identified as a predictable potential solution to this problem.

Indeed, it cannot be said that *any* given dithiol monomer is suitable to improve the impact resistance of a polythiourethane, as demonstrated in Table VII of the present specification (see comparative examples A and B). The present inventors discovered that the use of the claimed polysulfide dithiols prepolymers suited the requirements and objectives (obtaining an impact resistant, transparent, non-elastomeric material). Indeed, there is no relationship either in the cited references or in common general knowledge between the nature of the dithiol reactant and its ability to impart impact resistance, transparency and non-elastomeric properties. This unpredictable relationship was discovered by the present inventors. Thus, the examiner’s

obviousness finding is further based upon a “picking and choosing” from the art, while excluding various disclosures in the ‘507 application. Such a rationale clearly is inappropriate and exemplifies the hindsight aspects of the rejection.

Teaching Away. Saegebarth teaches that the polythiol reactants disclosed may be used to produce elastomeric properties (col. 1, l. 27-28). Consequently, Saegebarth teaches away from the claimed invention. A “reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the Appellant.” *Tec Air Inc. v. Denso Mfg. Michigan Inc.*, 192 F.3d 1353, 1360 (Fed. Cir. 1999).

The teachings of Saegebarth would lead a person of ordinary skill in the art away from producing a material suitable to the ophthalmic lens industry, where elastomeric materials are *not* acceptable. The fact that Saegebarth teaches away from the claimed invention is a significant factor to be considered in determining obviousness. *In re Gurley*, 27 F.3d 551, 554 (Fed. Cir. 1994); *In re Grasselli*, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983); MPEP § 2145[X](D)(2).

A further teaching away argument is that ‘507 application clearly requires the use of a polythiol **monomer** (or a disulfide linkage containing oligomer). By comparison, Saegebarth discloses the use of polythiol **prepolymers**. When polythiol oligomers are employed in the ‘507 application, they necessarily contain disulfide bonds formed by oxidative coupling, whereas the oligomerization or pre-polymerization reactions in Saegebarth do not generate **disulfide** bonds, but rather **sulfide** bonds. The oligomers of ‘507 application are not oligomers within the meaning of Saegebarth. These opposing teachings provide strong evidence that there is no

apparent reason to combine the ‘507 application and Saegebarth. Thus, this combination of references would *not* be made by the skilled artisan and thus can support the present rejection.

Reasonable Expectation of Success. The examiner additionally has not established that there would have been a reasonable expectation of success, in other words, that the combination of the ‘507 application and Saegebarth would have yielded more than predictable results. MPEP § 2143.02. For a routineer to select a specific class of polythiol reactant, there must be a reasonable expectation of success in their use. In this case, such would at a minimum require a finding that the chosen polythiol reactant would provide a impact resistance, transparency and non-elastomeric properties. However, there is no evidence on record suggesting that the modification of the ‘507 application’s teachings to include the presently claimed polythiol reactant class, as found in Saegebarth, would be successful. Indeed, it has been previously explained that selecting the appropriate class of polythiol reactant was not a predictable solution to the recognized needs. Consequently, it is not possible to argue that those skilled in the art would have replaced the polythiol monomers in the ‘507 application with the pre-polymers of Saegebarth with the specific technical purpose in mind of obtaining an impact resistant, transparent and non-elastomeric material.

Summary. For all of the preceding reasons, applicants again submit that the rejection is improper. The only basis for combining the reference as posited by the examiner is hindsight, and further, to advance such a combination flies in the face of inconsistent teachings with the references. Moreover, even if one *were* to combine these references, there clearly is no reasonable expectation of success considering the underlying purpose of providing optical materials. Reconsideration and withdrawal of the rejection is therefore respectfully requested.

b. WO 01/36508 in view of Saegebarth or Bertozzi

Claims 22-24, 29, 30, 33-35, 38, 40, 42 and 49 stand rejected under §103 as obvious over the ‘508 application in view of Saegebarth or Bertozzi. The ‘508 application presents, essentially, the same disclosure as discussed above for the ‘507 application. Saegebarth also is discussed above. Bertozzi is said to disclose a process for preparing polymercaptopolymers having a molecular weight of 400-25000 g/mol. These polymers may be reacted with polyisocyanates so as to form polythiourethanes (col. 8, l. 36-50). As discussed above, the ‘507 application, and here the ‘508 application, discloses a polythiol monomer instead of a polysulfide polythiol pre-polymer. Saegebarth and Bertozzi are said to address this deficiency. Applicants again traverse.

As discussed above, the rationale of the examiner for demonstrating the obviousness of the claims relies upon two presumptions. The first – that the ‘507 application discloses that thiol reactants used for producing the pre-polymer comprise oligomers or monomers having repeating units – is just as incorrect when viewed in light of the ‘508 application. Again, the term “oligomer,” as set forth in the ‘508 application, does not have the same meaning as in applicants’ claimed invention. In the ‘508 application, an oligomer *necessarily* has at least one disulfide linkage, as a result of the definition of polythiol oligomers in this reference. Actually, these oligomers are formed by oxidative coupling of thiols, which creates a -S-S- group. In contrast, in applicant’s claimed invention, polythiol oligomers must be *free of disulfide linkage*. Moreover, all oligomers described in the ‘508 application from page 7, line 19, to page 9, line 26, are compounds bearing at least one disulfide linkage (-S-S-). They thus give rise to iso(thio)cyanate prepolymers bearing at least one disulfide linkage (-S-S-), which fall outside the scope of claim 22. Moreover, the ‘508 application does not contemplate the use of dithiol prepolymers within the meaning of applicant’s claimed invention (without disulfide linkage), much

less *polysulfide* dithiol pre-polymers. Further, the choice of pre-polymers rather than monomers is a conscious one, and allows limiting of the rigidity, and thus improvement of impact resistance. Therefore, the reference is deficient in an aspect necessary for the examiner's position to be maintained. As such, this point alone merits withdrawal of the rejection.

Turning to (b), since the '508 application does not teach or suggest each of the present claim limitations, the examiner has attempted to combine it with Saegebarth or Bertozzi, which is said to describe polysulfide dithiol pre-polymers. Accordingly, the examiner argues that the use of such compounds for producing polythiourethanes was known. This much is correct: the secondary references do disclose/suggest the preparation of polythiourethanes from the compounds described therein. However, the examiner errs in concluding further that it would have been obvious to replace the polythiol monomer of the '508 application with the polysulfide dithiol pre-polymers of Saegebarth and Bertozzi *without* modifying the effects obtained in the '508 application, so as to arrive at the instant invention.

This motivation to combine the '508 application with Saegebarth or Bertozzi clearly is insufficient and stems from an *ex post facto* analysis, which is improper for the following reasons. First, there is no suggestion or motivation to combine the '508 application with Saegebarth or Bertozzi. Second, the examiner is improperly using hindsight reconstruction to support the obviousness rejection. Third, Saegebarth and Bertozzi teaches away from the claimed invention. And fourth, there is no reasonable expectation of success. Each of these points is discussed further, below, with respect to Bertozzi, given that the deficiencies regarding Saegebarth have already been provided above.

Motivation to Combine. In order to support this rejection, there must be a suggestion or motivation to combine the '508 application with Bertozzi. Here, however, those of skill in the

art had no reason or motivation to substitute the elements of the primary reference with the secondary reference. Bertozzi is not concerned with optical applications (col. 10, l. 5-10: puttylike materials or castings, films, plastics, elastomers, sealants, threads, coatings....), and does not aim at improving impact resistance of such materials. In contrast, the '508 application addresses optical polymers and uses thereof. There is no evidence presented, nor argument provided, as to why these two disparate references should be combined. The law requires more to establish *prima facie* obviousness.

Hindsight. It is clear that the examiner has built this rejection by relying on knowledge of the invention secured only from the instant specification. In the present case, one of ordinary skill in the art would *not* have recognized that the results of the combination were predictable, *i.e.*, that the polythiols described in Bertozzi would yield materials having satisfactory impact resistance, transparency and non-elastomeric properties. As explained above, and evidence by the comparative examples of the present invention, choosing the claimed polysulfide dithiols prepolymers was not a predictable endeavor that could have been implemented by a person of ordinary skill to solve the recognized problem of improving the impact resistance of a polythiourethane material, while remaining transparent and non-elastomeric. This unpredictable relationship was discovered by the present inventors. Thus, the examiner's obviousness finding is further based upon a "picking and choosing" from the art, while excluding various disclosures in the '508 application. Such a rationale clearly is inappropriate and exemplifies the hindsight aspects of the rejection.

Teaching Away. Bertozzi teaches that the polythiol reactants disclosed may be used to produce elastomeric properties (col. 1, l. 41-42). Consequently, Bertozzi teaches away from the claimed invention. A "reference may be said to teach away when a person of ordinary skill,

upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the Appellant.” *Tec Air Inc. v. Denso Mfg. Michigan Inc.*, 192 F.3d 1353, 1360 (Fed. Cir. 1999).

The teachings of Bertozzi would lead a person of ordinary skill in the art away from producing a material suitable to the ophthalmic lens industry, where elastomeric materials are **not** acceptable. The fact that Bertozzi teaches away from the claimed invention is a significant factor to be considered in determining obviousness. *In re Gurley*, 27 F.3d 551, 554 (Fed. Cir. 1994); *In re Grasselli*, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983); MPEP § 2145[X](D)(2).

Bertozzi teaches away from the present invention in at least another respect, since the better properties are obtained in Bertozzi by oxidative coupling of the polythiols polymers, which leads to the formation of disulfide linkage (col. 8, l. 10-20 and col. 9, l. 59-63). These teachings contradict those of the present invention (see Table VII in the present specification).

Yet another teaching away argument is that ‘508 application clearly requires the use of a polythiol **monomer** (or a disulfide linkage containing oligomer). By comparison, Bertozzi discloses the use of polythiol **prepolymers**. When polythiol oligomers are employed in the ‘508 application, they necessarily contain disulfide bonds formed by oxidative coupling, whereas the oligomerization or pre-polymerization reactions in Bertozzi do not generate **disulfide** bonds, but rather **sulfide** bonds. The oligomers of ‘508 application are not oligomers within the meaning of Bertozzi . These opposing teachings provide strong evidence that there is no apparent reason to combine the ‘508 application and Bertozzi. Thus, this combination of references would **not** be made by the skilled artisan and thus can support the present rejection.

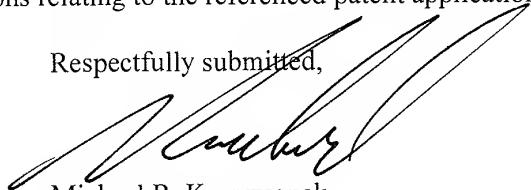
Reasonable Expectation of Success. The examiner additionally has not established that there would have been a reasonable expectation of success, in other words, that the combination of the ‘508 application and Bertozzi would have yielded more than predictable results. MPEP § 2143.02. For a routineer to select a specific class of polythiol reactant, there must be a reasonable expectation of success in their use. In this case, such would at a minimum require a finding that the chosen polythiol reactant would provide a impact resistance, transparency and non-elastomeric properties. However, there is no evidence on record suggesting that the modification of the ‘508 application’s teachings to include the presently claimed polythiol reactant class, as found in Bertozzi, would be successful. Indeed, it has been previously explained that selecting the appropriate class of polythiol reactant was not a predictable solution to the recognized needs. Consequently, it is not possible to argue that those skilled in the art would have replaced the polythiol monomers in the ‘508 application with the pre-polymers of Bertozzi with the specific technical purpose in mind of obtaining an impact resistant, transparent and non-elastomeric material.

Summary. As is evident from the preceding, the ‘508 application and Bertozzi cannot cure *any* of the deficiencies set forth above with respect to the ‘507 application and Saegebarth. Thus, for the same reasons that the ‘507 application and Saegebarth were unable to obviate the claimed invention, so too are the ‘508 application and Bertozzi (or Saegebarth). Reconsideration and withdrawal of this cumulative rejection is therefore requested.

D. Conclusion

Applicants believe that the present document is a full and complete response to the Office Action mailed December 17, 2008. The present case is in condition for allowance and such favorable action is requested. The examiner is invited to contact the undersigned at (512) 536-3020 with any questions, comments or suggestions relating to the referenced patent application.

Respectfully submitted,



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